

Remarks

Reconsideration and allowance of the subject application are respectfully solicited.

Claims 1-9 and 15-21 remain pending, with Claims 1 and 20 being independent. Claim 9 has been amended herein.

Applicants note with appreciation the indication that Claims 6, 7 and 21 recite allowable subject matter. These claims were objected to for being dependent upon rejected base claims. However, these claims will not be rewritten in independent form at this time because their respective independent claims are believed to be allowable for the reasons discussed below.

Claim 9 was rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Without conceding the propriety of this rejection, Claim 9 has been amended to depend from Claim 8 to provide clearer antecedent basis of the term in question. Reconsideration and withdrawal of the § 112, second paragraph, rejection are requested.

Claims 1, 3-5 and 18-20 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,116,714 (Imanaka et al.) in view of European Patent Application No. 0 642 925 (Schantz). Claims 2, 9 and 15-17 were rejected under § 103 in further view of U.S. Patent No. 5,053,790 (Stephenson et al.). Claim 8 was rejected under § 103 in further view of U.S. Patent No. 4,982,199 (Dunn). These rejections are respectfully traversed.

As is recited in independent Claim 1, the present invention relates to a printing apparatus which performs printing by moving a carriage unit, capable of holding a printhead having a plurality of heater resistances, over a print medium based on information transmitted by an external apparatus. The apparatus includes reception means and a voltage control unit. The reception means receives an information signal, related to a property of the heater resistances, transmitted from the printhead. The voltage control unit adjusts a voltage generated in the printing apparatus to drive the printhead based on the information signal received by the reception means. The voltage control unit is provided on the carriage unit.

As is recited in independent Claim 20, the present invention relates to a combination of a print head and a printing apparatus which performs printing by moving a carriage unit, capable of holding the printhead having a plurality of heater resistances, over a print medium based on information transmitted by an external apparatus. The printhead includes a switching device and a detection resistance. The switching device controls each of the plurality of heater resistances. The detection resistance has a property corresponding to a resistance property of the heater resistances. The printing apparatus includes a voltage control unit that adjusts a driving voltage generated in the printing apparatus. The detection resistance is manufactured by the same semiconductor deposition process as the heater resistances, and the voltage control unit is provided on the carriage unit.

With the above arrangements, an information signal, related to a property of heater resistances, is transmitted from the printhead and a voltage control unit, which is provided on a carriage unit, adjusts a voltage to drive the printhead. In independent Claim

1, this adjustment is based on that information signal. That is, the resistance property information is transmitted from the printhead and ultimately to the voltage control unit on the carriage unit. Further, a voltage generated in the printing apparatus (main body) can be adjusted by the voltage control unit based on the property information.

Imanaka et al. describes a printing apparatus having a printing head, in which correction data, obtained by a head correcting apparatus, is used for performing printing at an average density by correcting the characteristics of each heater board. As understood by Applicants, in Imanaka et al. recording head 900 has a plurality of heater resistances 901 and heater sensors 914, as described at col. 2, lines 31-54 and in Fig. 12. The configuration can carry preheating pulses, latch signals and heating pulses determined by MPU 1701 of a main body, as described at col. 13, line 50 through col. 14, line 3.

Applicants submit, however, that Imanaka et al. does not disclose or suggest a configuration for determining such preheating pulses, latch signals and heating pulses on the carriage. Nor is there any disclosure or suggestion of a circuit disposed on a carriage for adjusting a voltage for driving printing head 12.

Thus, Imanaka et al. fails to disclose or suggest at least a voltage control unit for adjusting a voltage generated in a printing apparatus, with the voltage control unit being provided on a carriage unit, as is recited in independent Claims 1 and 20.

Thus, Imanaka et al. fails to disclose or suggest important features of the present invention recited in the independent claims.

As discussed previously, the ink jet printhead of Schantz is described as having electrical connections and a circuit for power supply is provided on a carriage.

However, the power supply circuit in Schantz is used for stabilizing an unstable voltage outputted from a battery mounted in the cartridge. Schantz also fails to disclose or suggest a voltage control unit for adjusting a driving voltage generated in a printing apparatus, with such voltage control unit being provided on a carriage unit, as is recited in independent Claims 1 and 20.

Moreover, one of ordinary skill in the art would not be motivated, based on the teachings of Schantz, to provide the driving signal controller 7 and head voltage controller 9 of Imanaka et al. on a carriage unit. That is, in Schantz battery 74 is provided on the cartridge mounted on the carriage and because an on-board battery is employed, the advantages noted by the Examiner at col. 3, line 56 through col. 4, line 2 can be achieved. These advantages could not be achieved in the apparatus of Imanaka et al. where there is no on-board battery. Therefore, the proposed motivation to combine Imanaka et al. and Schantz is not well-founded.

Thus, Schantz fails to remedy the deficiencies of Imanaka et al. noted above with respect to the independent claims.

In the thermal printhead of Stephenson et al., a voltage coupled to the printhead is adjusted responsive to the sensed number of selected heat elements to maintain a constant predetermined voltage across the selected heat elements independent of the selected number thereof. In addition, the voltage is adjusted based on the temperature information measured by a thermal sensing device 506. However, Stephenson et al. also does not disclose or suggest at least a voltage control unit for adjusting a driving voltage generated in a printing apparatus, with the voltage control unit being provided on the

carriage unit. Accordingly, Stephenson et al. fails to remedy the deficiencies of the citations noted above with respect to the independent claims.

Dunn describes an ink jet method and apparatus that utilizes two pulses to eject each ink droplet, but is also not believed to remedy the deficiencies of the citations noted above with respect to the independent claims.

Thus, independent Claims 1 and 20 are patentable over the citations of record. Reconsideration and withdrawal of the § 103 rejections are respectfully requested.

For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1 and 20. Dependent Claims 2-9, 15-19 and 21 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

This Amendment After Final Rejection does not raise new issues, is an earnest attempt to advance prosecution and reduce the number of issues, and is believed to clearly place this application in condition for allowance. This Amendment was not earlier presented because Applicants earnestly believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of this Amendment under 37 CFR 1.116 is respectfully requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action, and an early Notice of Allowability are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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